



AMSAT™

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AMSAT-OSCAR 7 INFORMATION ISSUE

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EDITORIAL -- "Support"

By Tom Mitchell, WA3TBD

With the first anniversary of AMSAT-OSCAR 6 and the planning for AMSAT-OSCAR 7, it is time to reflect on the notice that the amateur satellite program has had within amateur radio.

We believe amateurs in general, even those who have not been able to use OSCAR 6, are justifiably proud of the amateur satellite program as a measure of the fact that amateur radio is still working at the "state of the art." Those who are active with the satellite are perhaps in a better position to consider the future of the amateur satellite program in the years to come.

One way to help provide for the stability of the program in the future is for those American and Canadian members who are using the satellite to report the fact to their Director in the American Radio Relay League.

In this way the representative body of amateur radio will be advised of the relative amount of interest. This will help to assure a broad base of support for the satellite program in years to come.

(Directors' addresses are found on page 8 of each month's QST.)

AMSAT Nets

The following AMSAT nets are now in operation:

North American East Coast 75 Meter AMSAT Net

Mondays 8:00 p.m. EST (0100Z Tues)

3855 KHz LSB

Net Control: W3ZM or W3TMZ

North America West Coast 75 Meter AMSAT Net

Mondays 8:00 p.m. PST (0400Z Tues)

3850 KHz LSB

Net Control: W6DMN or W6BGJ

International 20 Meter AMSAT Net

Sundays 1800Z

14,280 KHz USB

Net Control: W3ZM or others

International 15 Meter AMSAT Net

Sundays 1900Z

21,280 KHz USB

Net Control: W3ZM or others

European 40 Meter OSCAR 6 Net

Sundays 0930Z

7070 KHz LSB

European 80 Meter OSCAR 6 Net

After passes on ON days

3780 KHz LSB

JA Net

Mondays 1300Z

3560 KHz LSB

Net Control: JALANG

Southeast Asia Net

Thursdays 1300Z

14320 KHz USB

ZL OSCAR Net

Mondays, Thursdays & Saturdays, 7 p.m. NZT

3850 KHz LSB

Net Control: ZL1WB

In addition, the frequencies 3855 KHz (LSB) and 14,280 KHz (USB) are being used as general watch frequencies for satellite information after passes.

In the Washington area AMSAT traffic is handled via 2 meter FM on 146.85 MHz simplex and through the AMSAT repeater 146.25 to 146.85 MHz. Those interested in satellites in other parts of the country are urged to use these same frequency combinations where possible. If a repeater is already on 25/85, get on it. If not, try to set one up or use 146.85 simplex. In this way we can all communicate more easily with each other when traveling.

Another source of orbital information is the AMSAT HOTLINE: (703)938-5678.

LETTERS

I would like to congratulate all of you who worked so hard to build, test and see that OSCAR 6 has worked so well for the past year.

Dave Robinson, K7BBO
Tacoma, Wash.
October 9, 1973

Been very busy here but will be on during OSCAR 6's birthday. Congratulations on one year as projected.

Bill Hunter, K4TI
Weaverville, N.C.
October 10, 1973

FROM THE PRESIDENT'S DESK

By Perry I. Klein, K3JTE

One Year in Orbit

October 15th marked the first-year birthday of AMSAT-OSCAR 6, amateur radio's newest and longest lifetime satellite in space. The spacecraft continues to operate successfully, having surpassed our lifetime objective of one year.

During its first year, it is estimated that on the order of 100,000 or more contacts have been made through AMSAT-OSCAR 6's two-to-ten meter repeater, and amateurs in at least 74 countries have been participating in this new mode of amateur communications. Experiments have been continuing in order to learn more about radio wave propagation and space communications techniques, and the American Radio Relay League and NASA are now working together to use OSCAR in the schools.

After one full year of operation and over 5,000 orbits in space, the AMSAT-OSCAR 6 spacecraft appears to be in good shape in spite of some battery degradation, and we are hopeful that the satellite will continue to remain useful for some months to come. As the battery becomes weaker, it will be increasingly important that everyone cooperate in using the satellite repeater only during the scheduled ON periods.

AMSAT maintains an OSCAR 6 Users List of stations successfully communicating through the satellite. The list now numbers over 1,800 calls. We are trying to verify as many of these calls as possible, so we are urging all stations who have not yet reported their OSCAR 6 operation to send their reports to AMSAT, particularly an alphabetical listing of the QSL cards you have received for two way OSCAR contacts.

For many of us, the past year of satellite activity has been one of excitement, fulfillment and learning, as well as discouragement at times. The sixth amateur satellite is another step toward the goal of an operational Amateur Satellite Service. As a learning experience, AMSAT-OSCAR 6 has taught us new operating skills, and through its faults (and our own) has shown us how to take the next step -- and how to do a better job next time.

AMSAT-OSCAR 6 has verified our conviction that amateurs are capable of designing, building and operating long-lived communications spacecraft. It is an operational challenge as well as a design achievement to be able to successfully maintain the life of a spacecraft which has a total power budget of only three watts, for this length of time.

We are grateful to the National Aeronautics and Space Administration for making the launch of AMSAT-OSCAR 6 possible, and to the many organizations and individuals who have contributed either hardware, financially, or their personal time. It is only the total effort that has made the AMSAT-OSCAR 6 project a successful one.

LETTERS

Congratulations for such a fine job building and maintaining OSCAR 6! It has been a great service to amateur radio and proved the practicality of satellites for the small user like myself. As for reliability, if the automotive business were run by AMSAT, you'd put the spare parts industry right out of business!

Bob Crumrine, WB2DNN
Rochester, N. Y.
October 17, 1973

AMSAT-OSCAR 6 Users List Summary

October 15, 1973 (one full year of operation)

Total USA: 737 (40%)

Total Outside USA: 1,079 (60%)

Total Countries: 74 (according to ARRL Countries List)

Total Stations: 1,816

Ranking of AMSAT-OSCAR 6 Users by Country on a Per-Amateur Capita Basis (As of Oct. 15, 1973)

Rank	Country	Total Amateurs	OSCAR 6 Users	Percentage of amateurs using OSCAR 6
1	New Zealand	4,641	70	1.5 %
2	Australia	6,461	85	1.3 %
3	Finland	2,000	23	1.15%
4	France	7,500	81	1.1 %
5	Sweden	4,400	44	1.0 %
6	Czechoslovakia	2,070	20	0.97%
7	W. Germany	20,380	168	0.82%
8	England	16,837	113	0.67%
9	Japan	14,576	90	0.61%
10	Canada	12,892	57	0.44%
11	Italy	6,000	24	0.4 %
12	USA	282,850	737	0.26%
13	USSR	15,085	30	0.20%
14	Argentina	17,500	22	0.13%

Total 1564
(86% of all OSCAR Users)

AMSAT-OSCAR 6 User Countries:

ALAND I (OH0)	ENGLAND (G)	NORTHERN IRELAND (GI)
ALASKA (KL7)	ESTONIA (UR2)	NEW ZEALAND (ZL)
AMER. SAMOA (KS6)	FINLAND (OH)	PHILIPPINES (DU)
ANGOLA (CR6)	FRANCE (F)	POLAND (SP)
ANTARCTICA (VK0)	FRANZ JOSEPH LAND (UAI)	PORTUGAL (CT1)
ARGENTINA (LU)	GERMANY (DL,DM)	PRINCE EDWARD IS. (ZS2)
ARMENIA (UG6)	GREECE (SV)	RUMANIA (YO)
ASIATIC SSR (UW6)	GREENLAND (OX)	RHODESIA (ZE)
AUSTRALIA (VK)	HAWAII (KH6)	SCOTLAND (GM)
AUSTRIA (OE)	HUNGARY (HG)	SPAIN (EA)
AZORES (CT2)	ICELAND (TF)	SAINT PIERRE I (FP)
BAHRAIN (MP4)	INDIA (VU)	SOUTH AFRICA (ZS)
BARBADOS (8P6)	IRELAND (EI)	ST. MARTIN (PJ7)
BELGIUM (ON)	ISRAEL (4X)	SWEDEN (SM)
BERMUDA (VP9)	ITALY (I)	SWITZERLAND (HB)
BRAZIL (PY)	JAMAICA (5Y5)	TAKZHUK (UJ8)
BR VIRGIN I (VP2)	JAPAN (JA)	THAILAND (HS)
BULGARIA (LZ)	JERSEY (GC)	TURKS AND CAICOS I. (VP5)
CANADA (VE)	LUXEMBOURG (LX)	UKRAINE (UB5)
COLOMBIA (HK)	MALAYSIA (9M)	URUGUAY (CX)
COOK ISLANDS (ZK1)	MARSHALL ISLANDS (KX6)	U.S.A. (W,K)
CORSICA (PC6)	MEXICO (XE)	WALES (GW)
CURACAO (PJ9)	NETHERLANDS (PA)	WHITE RUSSIA (UC2)
CZECHOSLOVAKIA (OK)	NEW GUINEA (VK9)	YUGOSLAVIA (YU)
DENMARK (OZ)	NORWAY (LA)	
		74 Countries Total

MINUTES OF AMATEUR SATELLITE SERVICE COMMITTEE MEETING
September 14, 1973; Reston, Virginia

A meeting of the Amateur Satellite Service Committee was called to order at 9:15 a.m. on September 14, 1973, at the Sheraton Inn, Reston, Virginia. Those present were:

*William Eitel, WA7LRU (Chairman)
*Harry Dannals, W2TUK, ARRL
*Richard Daniels, WA4DGU, AMSAT
Charles Compton, W9BUO, ARRL
John Huntoon, W1RW, ARRL
William Dunkerley, WA2INB, ARRL

*Perry Klein, K3JTE, AMSAT
*V. C. Clark, W4KFC, ARRL
William Orr, W6SAI, OSCAR
Don Waters, ARRL
Richard Baldwin, W1RU, ARRL

(*Members, ASSC)

Minutes of the June 17, 1973, meeting were approved with a correction by Ray Vincent concerning the OSCAR Report and the disposition of funds donated to ARRL by WA7LRU and WA7LUN.

ARRL Report. Harry Dannals announced that the ARRL Board of Directors had approved the establishment of an ARRL Foundation, with its first order of effort oriented toward funding amateur space communications activities. Incorporation papers were momentarily in preparation by the League's Management & Finance Committee, with expectation of completion before the end of the day. Three members of that committee, Messrs. Larry Shima, Robert York Chapman and Larry Price, constitute an interim Board of Directors for the Foundation; a permanent Board of nine members will be chosen by the ARRL Board at the January annual (ARRL) meeting; five are required to be ARRL directors, and four may come from any field, and need not even be amateurs. Officers will be chosen from the nine directors of the Foundation. The next step is to obtain IRS approval, which normally requires two or more months, but it is expected the matter will be cleared by the January ARRL Board meeting. The Foundation may accept funds from the moment of incorporation, but tax exemption is not assured until IRS approval is received. It was noted that, to fill a possible gap in funding of space activities, contributions can be made tax-free to ARRL, for ultimate transfer to the Foundation, or directly to satellite projects. Bill Eitel expressed the concern of Project OSCAR in the Foundation matter, particularly as to who directors will be. Dannals explained that some details could not be released until the incorporation process was completed, but urged that potential candidates be recommended to ARRL directors prior to the January Board meeting; he cited Herbert Hoover III as an example candidate.

Perry Klein expressed concern about the funding prospects after February, 1974, in that satellite program planning beyond that date is not certain of financial support; Bill Orr properly termed it a possible "gap." Eitel said his personal efforts, low-key so far, had encountered reluctance to donate directly to ARRL or AMSAT, but an apparent willingness to donate to a Foundation when established. Perry Klein commented on the possibility of a "stretch out" of existing funds to June, but it was pointed out the principal reason for the \$38,000 ARRL appropriation was to speed completion by the end of February. It was agreed, however, that AMSAT should prepare and present future budgets, which Klein indicated would be on the order of \$82,000 for calendar year 1974. It was indicated unlikely that the ARRL could continue to appropriate additional funds from existing reserves because of the demands of the WARC and other commitments; however, the League would not insist on priority in repayment of the advance from Foundation funds to the exclusion of other uses.

Educational Matters. Bill Dunkerley and Don Waters reported that the Talcott Mountain curriculum had finally been received and should be ready for printing in about a month. ARRL is building a list of interested educators for the first mailing; as to the interim sample curriculum booklet, 1500 copies have been distributed. Bill, Don and Perry Klein will present a briefing to a number of NASA lecturers next week, for their background use in presenting later demonstrations around the country.

WIAW Remote Control. Dunkerley reported that the installation for OSCAR 6 command control was nearly complete at WIAW, awaiting only delivery of components. An application has been filed with FCC for remote control authorization, but an STA may be necessary for earlier action. Perry Klein pointed out the desirability of expediting this project so that assistance can be provided with the AO-6 control program.

OSCAR Report. Bill Orr stated that a spaceframe prototype has been built and tested, and parts for several more are under construction. Approximately \$13,000 worth of materials has been donated or financed by OSCAR. An observatory in Oaxaca, Mexico, has been equipped with amateur gear, with some interest evidenced by NASA in this project to tie in satellite communications.

Orr inquired concerning a 1971 Swedish proposal to use part of the 400 MHz band, and the possible effect on amateurs of the forthcoming maritime conference; Dick Baldwin indicated that these appear to offer no threat to amateur allocations, but the matter is being watched; G2BVN will attend the conference as an IARU observer.

OSCAR 6 Report. Perry Klein remarked that September 15 will complete 11 months of OSCAR 6. Batteries are degrading somewhat, and the operating schedule reduced accordingly in order to extend useful life. Aeronautical, land and maritime mobile communications have been accomplished through the satellite, and even radio control of model craft. Over 1,500 different users have been recorded so far -- 650 in the U.S., and 850 outside. On a per capita basis, leaders in order of use are ZL, VK, F, SM, DL, JA, G, VE, W, UA. W3TMZ, K4TI and W9OII have all made WAS.

OSCAR 7 Progress. Klein reported that AOB has NASA approval, and a March launch is still an objective, with progress on schedule. There is a parallel development of a production-type 2-to-10 meter repeater; VE3QB has a breadboard of the 435-MHz beacon ready and there is cooperation from most everyone involved including the Goddard center and RCA. FCC has expressed the view that call letters should be assigned rather than the traditional "HI," and this is currently under discussion.

Bill Eitel commented on the large amount of support coming from industry and the importance of keeping the program going, with a need for continuity paramount. Discussion indicated the desirability of Don Waters undertaking an article or similar promotional material telling the story and pointing out need for funding. Dick Daniels suggested a cassette program on the subject.

Harry Dannals announced that effective immediately he was turning his duties on ASSC over to ARRL First Vice President Charles Compton, WØBUO, because of heavy pressure of other League responsibilities. The committee expressed deep appreciation for W2TUK's contributions to ASSC progress.

The Committee adjourned at 1:55 p.m.

V. C. Clark, W4KFC

BOARD OF DIRECTORS MEETING

September 16, 1973

The meeting was called to order by President Klein at 11:25 a.m., at the Sheraton International Conference Center, Reston, Virginia.

In attendance were:

P. Klein, K3JTE
R. Soifer, K2QBW
W. Hook, W3QBC
C. Dorian, W3JPT
W. Tynan, W3KMY
J. King, W3GEV

W. Dunkerley, WA2INB
W. Eitel, W6UF/WA7LRU
L. Eitel, WB6MRW/WA7LUN
L. Kayser, VE3QB
J. Kasser, G3ZCZ/W3
J. Gregory, W3ATE

President Klein announced that the tellers had completed the vote count and that from the ten nominations the following four members were elected to serve as Directors for the next two years: P. Klein, C. Dorian, W. Tynan and J. King. K. Meinzer, DJ4ZC and R. Carpenter, W3OTC were elected first and second alternate Director, respectively.

There was a short discussion of officers for the coming year. The present officers agreed to continue to serve in the existing jobs. In addition, the Board unanimously agreed to appoint Larry Lazar, WA2AAD as Manager, Emergency Communications Planning.

After discussion, it was agreed that the existing bylaws were up-to-date and were not in need of amendment.

It was agreed that subject to the availability of the necessary designated funds, President Klein would continue to serve as full-time President. The required extension of an employment agreement was signed by the Directors present. It was also agreed that the President would continue to serve on the Board of Directors, as elected.

It was agreed that the ready availability of the Directors for meetings rendered the need for an Executive Committee as moot. The issue will be considered again whenever Directors are elected who live a considerable distance apart.

Approval was given to reimburse the following for travel expenses in support of AMSAT:

J. King - Central States VHF Society Meeting

J. Fox and R. Dunbar - Technical Symposium & AMSAT Coordination

L. Kayser - Technical Symposium & AMSAT Coordination

After some discussion it was agreed to request NASA to identify our present satellite as AMSAT-OSCAR 6 in their "Satellite Situation Report."

Approval was given to the designation of Bill Eitel, WA7LRU as a back-up West Coast command station.

The meeting adjourned at 1:00 p.m.

Charles Dorian, W3JPT

BOARD OF DIRECTORS MEETING

October 15, 1973

The meeting was called to order at 7:45 p.m., by President Klein, K3JTE. Present were:

P. Klein, K3JTE
W. Dunkerley, WA2INB
J. King, W3GEY

W. Hook, W3QBC
C. Dorian, W3JPT

Discussion was given to the question of life membership. W. Hook reported that 30 responses were received indicating support for such a membership. After a review of the possibilities, it was agreed to establish a life membership for a donation of \$50 or more for a member and \$100 or more for a member society.

The 1974 budget was submitted by President Klein and discussed. A budget of \$85,130 was approved and the specific allocation among the various budget items was decided upon.

The follow-on program to A-O-B was discussed. It was agreed that the proposal made originally for a Syncart repeater, which was to be included on the ATS-G satellite, would be updated and developed as one of the possible follow-on repeaters. The Project Manager, Jan King, spoke of the efforts underway by the Australians and the Germans, AMSAT Deutschland. Additional information on the Australian project is desired and President Klein is to explore its status. At the AMSAT technical meeting in February there was an understanding reached whereby these two organizations would be partially supported in their endeavors by AMSAT.

Bill Dunkerley reported on the status of the Satellite Educational Program and the forthcoming attendance at the New York State Educators Meeting. ARRL will be represented by Bill Dunkerley, Dave Sumner, and Don Waters. Additional copies of the educational booklet have been prepared for this affair. Fred Merry, W2GN will establish a satellite transmitting and receive station for demonstrations with OSCAR 6.

Jan King reported on the status of A-O-B. It is anticipated that integration of the satellite will be completed by November or early December with a test program to immediately follow, and that it is expected to have the spacecraft fully ready for launch by early March.

The meeting adjourned at 10:30 p.m.

Charles Dorian, W3JPT

September 15, 1973

SUMMARY OF AMSAT-OSCAR-B SPACECRAFT SYSTEM

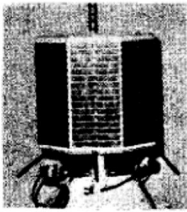
AMSAT-OSCAR-B SPACECRAFT

A-O-B (to be known as OSCAR 7 after launch) is an international effort now involving four nations. The A-O-B systems developed in each country are as follows:

Germany:	AMSAT Deutschland Repeater, Spacecraft Structure, Battery Charge Regulator, 28V Power Regulator, Antenna System - DJ4ZC, DJ5KQ.
Australia:	Two Redundant Command Decoders, Teletype Telemetry Encoder - VK3ZPI.
Canada:	435.1 MHz Beacon Transmitter - VE3QB, VE2AO, and VE3FUA.
United States:	2M/10M Repeater, Morse Code Telemetry Encoder, Experiment Control Logic, Instrumentation Switching Regulator, Solar Panels, Battery - K3JTE, W3GEY, WA4DGU, W3DTN, Marie Marr. Codestore - W5CAY. S-Band Beacon Transmitter -K6HIJ.

1. AMSAT Deutschland Repeater (designed by Karl Meinzer, DJ4ZC)
 - . Input freq. passband between 432.125 and 432.175 MHz.
 - . Output freq. passband between 145.975 and 145.925 MHz.
 - . Power output (high power mode) is 14W PEP.
 - . Satellite uplink and downlink antennas are circularly polarized.
 - . Downlink passband is inverted from uplink passband.
 - . Repeater is 45% efficient using envelope elimination and restoration technique.
 - . Linear Operation -- SSB and CW are preferred modes.
 - . Repeater is commandable to either 3.75 or 14W PEP output.
 - . Telemetry beacon at 145.980 MHz (200 mW).
 - . Uplink power required - 300-400 W. EIRP.
2. AMSAT Two-to-Ten Meter Repeater (designed by Perry Klein, K3JTE)
 - . Input freq. passband between 145.85 and 145.95 MHz.
 - . Output freq. passband between 29.40 and 29.50 MHz.
 - . Power output is 2W PEP.
 - . Satellite uplink antenna is circularly polarized.
 - . Downlink passband is not inverted from uplink passband.
 - . Linear Operation -- SSB and CW are preferred modes.
 - . Telemetry beacon at 29.50 MHz (not same as OSCAR 6).
 - . Uplink power required - 80-100 W. EIRP.
3. Morse Code Telemetry Encoder (designed by John Goode, W5CAY)
 - . 24 analog input channels.
 - . Converts each analog value into a two-digit Morse code number or "word."
 - . A third digit precedes the telemetry value and gives the line number in which the word is located.
 - . Format is arranged four words per line, six lines per telemetry frame.
 - . Morse code rate is commandable to 10 w.p.m. or 20 w.p.m.
3. Teletype Telemetry Encoder (developed by Peter Hammer, VK3ZPI and Edwin Schoell, VK3BDS)
 - . 60 analog input channels.
 - . Converts each analog channel to a three-digit number transmitted in Baudot code.

- . Each three-digit value is preceded by its channel number, making a five-digit telemetry word.
 - . The data is arranged 10 words per line by six lines per telemetry frame.
 - . Two lines of status information follow the analog matrix and give the spacecraft time (i.e., time in "counts" from launch, 1 count = 96 minutes).
 - . Output keys 435.1 MHz beacon in FSK: 850-Hz shift; 45.5 Baud: (reversed from U.S. standard). Also keys 145.98 and 29.50 MHz beacons as AFSK, on command.
5. 435.1 MHz Beacon Transmitter (developed by Larry Kayser, VE3QB and Bob Pepper, VE2AO)
 - . Beacon output freq. is 435.10 MHz.
 - . Power output is 0.4W at an efficiency of 45%.
 - . Beacon is FSK modulated 850-Hz shift.
 6. 2304.1 MHz Small Beacon Transmitter (developed by San Bernardino Microwave Society)
 - . 0.1W at 2304.1 MHz.
 - . Turned on by command only for 30-min. periods.
 - . CW keyed -- III followed by 30-sec. carrier. Also FSK keyed with Morse code telemetry on command.
 7. Codestore -- Message store-and-forward system (built by John Goode, W5CAY)
 - . 896 bit memory capacity using COS-MOS shift register memory.
 - . Loaded via command link.
 - . Output code speed is 13 w.p.m.
 8. Experiment Control Logic (designed by Jan King, W3GEY)
 - . Selects the spacecraft operating modes.
 - . Protects satellite against excessive battery drain by reducing repeater output power or by shutting it off completely.
 9. Input Solar Power / Battery Charge Regulator (developed by Karl Meinzer, DJ4ZC and Werner Haas, DJ5KQ)
 - . Converts 6.4V at arrays to 14V to charge battery or to supply the spacecraft experiments.
 - . Senses overcharge of battery and reduces charging current.
 - . Senses failure of either of the two redundant regulators and switches to the opposite regulator automatically.



AMSAT-OSCAR 7 AND ITS CAPABILITIES*

(What it is, and how to use it.)

By Joe Kasser, G3ZCZ/W3 and
Jan A. King, W3GEY

Introduction

This paper briefly describes the AMSAT-OSCAR 7 radio amateur satellite, its modes of operation, its orbit and tracking information, and also specifies the type of ground equipment needed to work through or receive signals from the spacecraft.

The Spacecraft

AMSAT-OSCAR 7 is the second in the AMSAT-OSCAR-B series of long-life amateur spacecraft. It is built in an octahedral (8-sided solid) configuration, allowing sufficient surface area for enough solar cells to provide a positive power budget system. This means that unlike OSCAR 6, this spacecraft should not have to be commanded into recharge modes periodically.

Physically, the experiments and individual modules are built in a "plug-in module" construction. This allows the same spacecraft configuration to contain a number of different experiments and modules. The main difference between this spacecraft and OSCAR 6 is that OSCAR 7 contains two repeaters and two auxiliary beacons, and both Morse code and teletype telemetry encoders.

The OSCAR 7 two-to-ten meter repeater has an output power of 2 watts PEP. This will make received signals somewhat stronger at the ground than those coming from OSCAR 6. The second repeater is the AMSAT Deutschland repeater which relays signals from 432 MHz to 145.9 MHz with an internal beacon on 145.98 MHz. The unit was designed and built by Dr. Karl Meinzer, DJ4ZC and Werner Haas, DJ5KQ. The two beacons consist of a Canadian-built 435.1 MHz beacon similar to the one flown on OSCAR 6, and a second auxiliary beacon at 2304.1 MHz developed by members of the San Bernardino Microwave Society.

Ground control of the spacecraft is achieved by means of command receivers in each repeater, redundant command decoders and an Experiment Control Logic subsystem.

Downlinked telemetry and stored message data are generated by the Morse code telemetry encoder, or the Codestore unit, these two systems being identical to those flown on OSCAR 6, and a new teletype telemetry encoder designed and built by Dr. Peter Hammer, VK3ZPI and Edwin Schoell, VK3BDS.

The Codestore, Morse code telemetry and teletype telemetry signals can be routed to any of the four beacons in the spacecraft.** The four beacons include two in the repeaters and two auxiliary transmitters in a similar manner to OSCAR 6. It is thus possible, for example, to receive Morse code telemetry on the 29.50 MHz beacon and teletype telemetry on the 435.1 MHz beacon at the same time (on two receivers).

The primary power source of the spacecraft consists of eight solar cell arrays supplying 2.2 Amps at 6.4 volts when illuminated by the sun. A Battery Charge Regulator converts the raw solar cell array output to a +14 volt supply bus. This supply line charges the battery and supplies the spacecraft loads if the solar cell current is not sufficient to run the spacecraft (for example when the satellite is on the dark side of the earth). During these periods, the Nicad battery supplies the extra power. Two other redundant switching regulators supply the remaining voltages needed by the spacecraft modules.

*Presented at the ARRL Technical Symposium, Reston, Virginia, Sept. 14, 1971

**There is one exception; the 2304.1 MHz beacon cannot be keyed with Codestore or teletype telemetry.

Modes of Operation

OSCAR 7 has four automatic modes of operation defined as follows:

Mode A: AMSAT two-to-ten meter repeater.

Mode B: AMSAT Deutschland 432-to-146 MHz repeater in high-power mode.

Mode C: AMSAT Deutschland 432-to-146 MHz repeater in low-power mode.

Mode D: Recharge mode.

Each of these modes of operation may be overridden by ground command. In Mode D either the 435.1 MHz or the 2304.1 MHz beacon can be operational upon ground command, while none of the repeaters will be operating. It is also possible to have the 435.1 MHz auxiliary beacon operational by ground command while the spacecraft is operating in Mode A. The 2304.1 MHz beacon can be operated in any of the Modes A through D.

The spacecraft will normally alternate between Modes A and B. An internal timer in the spacecraft generates a pulse every 24 hours which causes the satellite to switch between these two modes. The 24-hour timer will be set by ground command so that the mode change can be kept at approximately the same time each day. Thus, each repeater will be operational on alternate days.

The spacecraft contains automatic power supply monitoring circuitry, such that if the battery charge drops 60% below the full-charge value, the spacecraft will automatically switch to Mode C and reset the timer so as to stay in that mode for 24 hours. In Mode C, the AMSAT Deutschland repeater output power is reduced to 2.5 watts PEP, and the battery drain should be reduced sufficiently to permit the battery to be recharged by the solar cell arrays.

The switch to Mode C takes place under low battery charge conditions when the spacecraft is operating in either Mode A or Mode B. If the battery charge recovers, the spacecraft will switch to Mode B at the next 24-hour pulse, and then continue normal operation.

If the battery power does not recover, but deteriorates even further so that the battery charge drops 70% below the full-charge value, the spacecraft will automatically switch to Mode D and reset the 24-hour timer. Both repeaters will then be switched off, but the 435.1 or 2304.1 MHz beacons can be switched on by ground command to allow telemetry to be received.

Modes C and D are actually expected to serve as backup operating modes for use if the spacecraft available power reserves are low. Normally, operation in these modes will not be required.

Each of the modes can be changed by ground command so as to turn any repeater or beacon on or off as required. This is done so that any failure of the automatic control circuits can be overcome by ground command.

Initial Launch Operation

The spacecraft contains an initial condition reset circuit so that the antennas will deploy after separation from the launch vehicle and the spacecraft will power up in Mode D with the 435.1 MHz beacon on. No repeaters will be operational for at least the first day, so everyone should forget about working through OSCAR and settle down and copy telemetry. It is expected that the repeaters will not be turned on until the spacecraft has stabilized electrically and thermally, as indicated from telemetry data.

Orbit and Tracking Data

The expected orbit for OSCAR 7 is very similar to OSCAR 6. The orbit is expected to be sun-synchronous with an almost identical period and inclination. Thus, the same tracking procedures used for OSCAR 6 will be suitable for use with OSCAR 7.

OSCAR 7 is expected to be placed into orbit so that it is half an orbit ahead of or behind OSCAR 6. Currently, OSCAR 6 comes over daily at a time about 5 minutes earlier every 48 hours. If all goes well, OSCAR 7 is to be launched so that it will come over about 2 1/2 minutes earlier than OSCAR 6 did the day before, and similarly, OSCAR 6 will come over about 2 1/2 minutes earlier than OSCAR 7 did the day before. It is thus possible to expect that instead of three usable spacecraft passes about two hours apart each evening, there will be five or six passes (assuming OSCAR 6 is in operation) about sixty minutes apart.

The reference orbit data for OSCAR 7 will also be published in the same format as the OSCAR 6 data has been up to now, so as to enable each individual to plot his own orbital information.

Ground Equipment Requirements

In considering the ground equipment needed for OSCAR 7, each repeater or beacon will be discussed separately in terms of the ground equipment needed to operate with it.

1. AMSAT Two-to-Ten Meter Repeater

The two-to-ten meter repeater operates in a linear mode similar to the unit flown on OSCAR 6. As such, SSB and CW are the preferred operating modes. The repeater receives signals between 145.85 and 145.95 MHz and re-radiates them between 29.4 and 29.5 MHz. There is also a telemetry beacon on 29.50 MHz.

Note that these frequencies are different from those employed with OSCAR 6. They reflect comments received on the operational experience obtained with OSCAR 6. The repeater has an output power of 2 watts PEP, so received ground signals should be stronger - but don't throw those preamplifiers away yet!

The same equipment used to work through OSCAR 6 will be suitable for working through this repeater, namely a sensitive receiver, and preamplifier if possible, as well as a suitable ten-meter antenna. Since the spacecraft will again be using a linearly polarized ten-meter antenna, the ground station antenna should preferably be circularly polarized. Linearly polarized ten-meter receiving antennas can also be used, but at the sacrifice of some fading.

The transmitting equipment should be capable of putting out no more than 80-100 watts of effective radiated power from the antenna. It is operationally preferable to use a transmitter with an output power of the order of 80-100 watts and a simple ground plane or turnstile antenna than to use a lower powered transmitter and more directional antenna. Communicating through OSCAR in a low orbit is a challenge for the single operator. Besides tuning the transmitter and receiver, it is necessary to keep both antennas tracking the spacecraft - and then work someone in between. Surely there must be advantages in minimizing the duties to be performed during each pass so as to be able to concentrate on the important business of making contacts through the satellite. This can be partly achieved by using the low-gain antennas and the 80-100 watts indicated.

2. AMSAT Deutschland 432-to-145.9 MHz Repeater

The AMSAT Deutschland repeater is also a linear device. Again, CW and SSB (or controlled-carrier AM) are the preferred operating modes. The repeater has an input frequency passband between 432.125 MHz and 432.175 MHz, and an output frequency passband between 145.975 MHz and 145.925 MHz. The output passband is inverted. That is, upper-sideband signals transmitted to the spacecraft would be received on lower sideband.

The relationship between input and output frequencies is such that a received signal on 432.125 MHz would be relayed on 145.975 MHz, and similarly, a received signal on 432.175 MHz would be relayed on 145.925 MHz, i.e., tune up the band at 432 MHz and down the band at 146 MHz. This repeater also has a telemetry beacon on 145.980 MHz.

Any receiver with a good two-meter converter should be able to receive signals from this repeater, even with a simple antenna. Since the spacecraft antennas associated with this repeater are circularly polarized, linearly polarized antennas will be suitable for ground use. If linearly polarized, the receiving antenna for this repeater can be the same one used to work through the two-to-ten meter repeater.

On the transmitting side, the recommended effective radiated power output is of the order of 300-400 watts. Thus, a 30-watt transmitter will require an antenna with a gain of the order of 10-12 dB, but it would be preferable to obtain or even build a 300-watt amplifier and use an omnidirectional antenna to reduce the antenna pointing accuracy requirements.

Though the spacecraft will have circularly polarized antennas for this repeater so that linear antennas at ground stations will work fine, it is important not to forget that circularly polarized ground station antennas can be expected to provide as much as 3 dB more signal, and this might be the difference between making or missing a contact. All circularly polarized antennas used with this repeater should be right-hand circularly polarized (RHCP) in the Northern Hemisphere and left-hand circularly polarized (LHCP) in the Southern Hemisphere.

The easiest way of generating RF for the 432 MHz uplink is probably to convert a surplus 450 MHz FM transmitter strip for CW operation on 432 MHz. This should not be too difficult, even for inexperienced VHFers. Other techniques are to triple 144 MHz signals to 432 MHz or double 220 MHz to 440 MHz and use a different crystal to transmit on 432 MHz. The best method is to build a transverter from say 50 MHz to 432 MHz. This would allow both SSB and CW operation with full VFO control.

3. 435.1 MHz Auxiliary Beacon

The Canadian 435.1 MHz beacon will usually be operating when the spacecraft is in Modes A or D. It will not operate while the spacecraft is in Modes B or C because of interference effects with the 432 MHz uplink of the AMSAT Deutschland repeater.

Extremely good signal levels were copied from the OSCAR 6 435.1 MHz beacon during the early months that it was operating. For receiving the signals, a receiver with any good converter and antenna will be suitable. Again, a circularly polarized antenna would be preferable.* The converter should be fitted with a new crystal so as to cover 435.1 MHz instead of the more conventional 432 MHz.

Doppler shifts of the order of ± 10 kHz can be expected on the signals, so be prepared to keep retuning during the pass.

4. 2304.1 MHz S-Band Beacon

The 2304.1 MHz beacon, built by members of the San Bernardino Microwave Society in California, will transmit a "HI" in Morse code followed by thirty seconds of continuous carrier for tracking purposes. The beacon contains an internal thirty-minute timer to ensure positive control which will shut down the beacon 30 minutes after it is commanded on. The 2304.1 MHz beacon can also be keyed with Morse code telemetry on ground command.

*In this case, LHCP should be used in the Northern Hemisphere and RHCP in the Southern Hemisphere.

Link calculations have been done for the spacecraft-to-ground communications link to determine the sort of equipment needed. Consider a typical ground station using a four-foot dish and a converter with a 6 dB noise figure. The link calculations are as follows:

Spacecraft output power (100 mW)	+ 20 dBm
Path loss to ground for 2000 miles	<u>-170 dB</u>
Thus, signal level at antenna =	-150 dBm
Gain of four-foot dish	+ 27 dB
Polarization and line losses	<u>- 6 dB</u>
Signal power at converter input	-129 dBm
Noise power in a 500 Hz bandwidth, 6 dB noise figure receiver	<u>-141 dBm</u>
Thus, received signal-to-noise ratio is	+ 12 dB

This was calculated for a four-foot dish and a receiver with a bandwidth of 500 Hz. The Doppler shift for an overhead pass at this frequency has been calculated to be ± 55 kHz. The 3 dB beamwidth of the four-foot dish is only 7.5°. Anybody trying to track the S-band beacon is going to have a lot of fun.*

Copying Telemetry

OSCAR 7 contains two separate telemetry encoders: a Morse code unit identical to that flown on OSCAR 6 and an 850-Hz shift teletype encoder designed and built in Australia.

Morse Code Telemetry-

The Morse code telemetry format is identical to that of OSCAR 6. The format is arranged in six lines of four words. The first digit of each three-figure "word" is the line identifier. Each telemetry frame is separated from the next by the "HI" identifier. The code speed, like OSCAR 6, is commandable between 10 and 20 WPM.

Teletype Telemetry-

Sixty channels of data are monitored and encoded by the WIA-Project Australis teletype telemetry encoder. The data is formatted as ten words per line in six lines of data. Each data word contains five digits. The first two digits indicate the channel number, and the last three represent the encoded sensor data digits.

Between each data frame are two lines of digital data which provide information on the spacecraft clock and command register status.

The encoder has two operating modes. There is a stepping mode in which each channel is sampled in turn, and a single-channel "dwell" mode in which one channel is sampled continuously. Each line of data is followed by a carriage return, line feed and figures signal, so as to keep the printer in upper case.

*For anyone who wants to build a converter, *Ham Radio* contains a fairly simple design in the March 1972 issue. Another 2304 MHz converter is described in January 1974 *QST*.

The teletype data is transmitted from the spacecraft in Baudot code using 850-Hz shift. Signals will be frequency-shift keyed on 435.1 MHz and audio-frequency shift keyed on 145.98 and 29.500 MHz. It may be necessary to be able to reverse the mark and space tones in the ground station terminal unit to receive the AFSK telemetry.

Doppler on the 435.1 MHz beacon will be of the order of ± 10 kHz for a pass directly overhead. Tests were conducted from WA3EWJ transmitting FSK RTTY through the two-to-ten meter repeater in OSCAR 6 during January 1973. It was found that the 5 kHz Doppler shift encountered there did not cause any appreciable errors. It was just necessary to keep retuning the receiver every few minutes. Thus, the tuning rate will just have to be increased to cope with the extra Doppler shift.

A better idea is to use a special IF with a 25 kHz bandwidth and a phase-lock loop teletype terminal unit using one of the phase-lock integrated circuits now available at low cost.

Summary

This paper has briefly described OSCAR 7, its projected orbit and the type of equipment needed to operate with it. A summary table of the frequencies of interest is presented below.

Beacons

29.50 MHz	Mode A	Associated with the two-to-ten meter repeater.
145.98 MHz	Mode B, C	Associated with the 432-to-146 MHz repeater.
435.10 MHz	Mode A, D	Teletype, Morse code or Codestore keying.
2304.1 MHz	Mode A, B, C, D	CW tracking beacon and Morse code telemetry.

Repeaters

Mode A	{ 145.85 MHz to 145.95 MHz input 29.40 MHz to 29.50 MHz output (non-inverting passband)
Mode B, C	{ 432.125 MHz to 432.175 MHz input 145.975 MHz to 145.925 MHz output (inverted passband)

It is hoped that those reading this article will want to try their hand in participating with OSCAR 7, certainly the most advanced satellite yet developed for the amateur service.

LETTERS

My congratulations to AMSAT for a highly successful year of amateur satellite communication.

Richard J. Cotton, W8DX
Detroit, Mich.
October 19, 1973

FCC NOTICE OF INQUIRY ON THE AMATEUR-SATELLITE SERVICE

In order to develop the recently established Amateur-Satellite Service in an orderly fashion and in a spirit of cooperation with other amateur radio activities sharing the same frequencies, the U.S. Federal Communications Commission has issued a Notice of Inquiry requesting comments and suggestions for specific rules to be adopted for the new service.

To assist the F.C.C. in formulating rules for the Amateur-Satellite Service, knowledgeable parties are invited to submit comments and suggestions on the following:

- a. What specific types of stations and/or functions should be provided for in the Amateur-satellite Service, in addition to space stations? Earth stations? Telecommand stations? Others?
- b. What should be the station license requirements and privileges for the above stations? What representations should be made for these stations in applications for licensing?
- c. What classes of amateur radio operator licenses should be a prerequisite for the above station licenses? What should be the operating privileges at these stations? What material should be added to the examinations for these operator classes?
- d. What technical standards should be adopted? What should the telecommand and telemetry requirements be? What emissions should be authorized?
- e. What should the rules provide for in the way of operating requirements and procedures? Station identification requirements? Station log requirements? Should distinctive call signs be assigned?
- f. What other provisions should be included in the rules?

If you have any comments and thoughts on this matter, please communicate them to AMSAT. Comments to the Commission must be filed by January 7, 1974.

AMSAT gratefully acknowledges recent donations of \$25.00 or more (or equivalent) from the following:

The American Radio Relay League
Central States VHF Society
Alan M. Chedester - WA3PIC
Richard J. Cotton - W8DX
Harold D. DeVoe - KL7MF
Stephen J. Hay - K5RZU
Hewlett - Packard
International Amateur Radio Union - Region 1
Fred J. Merry - W2GN
Jay Mahoney - W6YDF
W. M. Oettmeier - W4BY
Project OSCAR, Inc.
Radio Corporation of America
Jack H. Ross - K4NTD
Bruce Rowlings - ZL1WB

We also thank the many others who made financial contributions to the AMSAT-OSCAR projects.

AN OSCAR ANGLE NOMOGRAM

By Roy E. Gould - W5PAG

To make full use of a high gain antenna array, the azimuth and elevation angles to the satellite must be known so that it can be tracked by the antennas during the pass. In search of a method for determining the proper antenna angles, I have developed the nomogram described here.

The nomogram is based on these equations:

$$D = \arccos \left(\frac{R}{R+h} \cos \gamma \right) - \gamma$$

$$\sin B = \sin A \cos D + \cos A \sin D \cos C$$

$$\sin L = \frac{\sin C \sin D}{\cos B}$$

Where: D = distance along path in degrees

R = radius of the earth

h = height of the satellite above the earth's surface

γ = elevation angle in degrees

B = latitude of the satellite

A = latitude of the receiving point

C = heading to the satellite from north

L = longitude difference between receiver and satellite.

The last two equations were derived from the heading and distance equations found in the ARRL Antenna Book.

The nomogram shown in Figure 1 was drawn with the aid of a Hewlett-Packard HP-9820 calculator with plotter. It could also have been drawn by first calculating the points and then plotting the curves by hand. Note that only points from 0 to 180 degrees heading need be calculated because one side of the figure is a mirror image of the other.

Even if directional antennas are not used, the information available from the nomogram is still useful and interesting. One piece of information all stations need is the time-of-acquisition and the time at loss-of-signal. If only this information is desired, only the outside ring need be plotted. It is obtained using an elevation angle of zero ($\gamma=0$) in the equations. This simple nomogram will also give the time of closest approach and will give some idea of how close the satellite will pass.

To use the nomogram, the orbital path of the satellite as a function of time must be known. The orbital information for OSCAR 6 given in the December 1972 Newsletter was used to plot the two orbit path plots shown in Figures 2 and 3. I plotted these on a piece of flexible plastic so that the nomogram could be easily read through the overlay. Instead of breaking the path into two sections, they can be plotted as one continuous plot. This would be desirable for those living far enough north to be within range of the OSCAR when it is at its most northerly position.

The distorted circles are "iso-elevation" angle lines and the spirals are "iso-heading" lines. To determine the elevation angle and the heading as a function of time, the orbital path overlay is first positioned on the nomogram with the equator line of the overlay aligned with the equator line on the

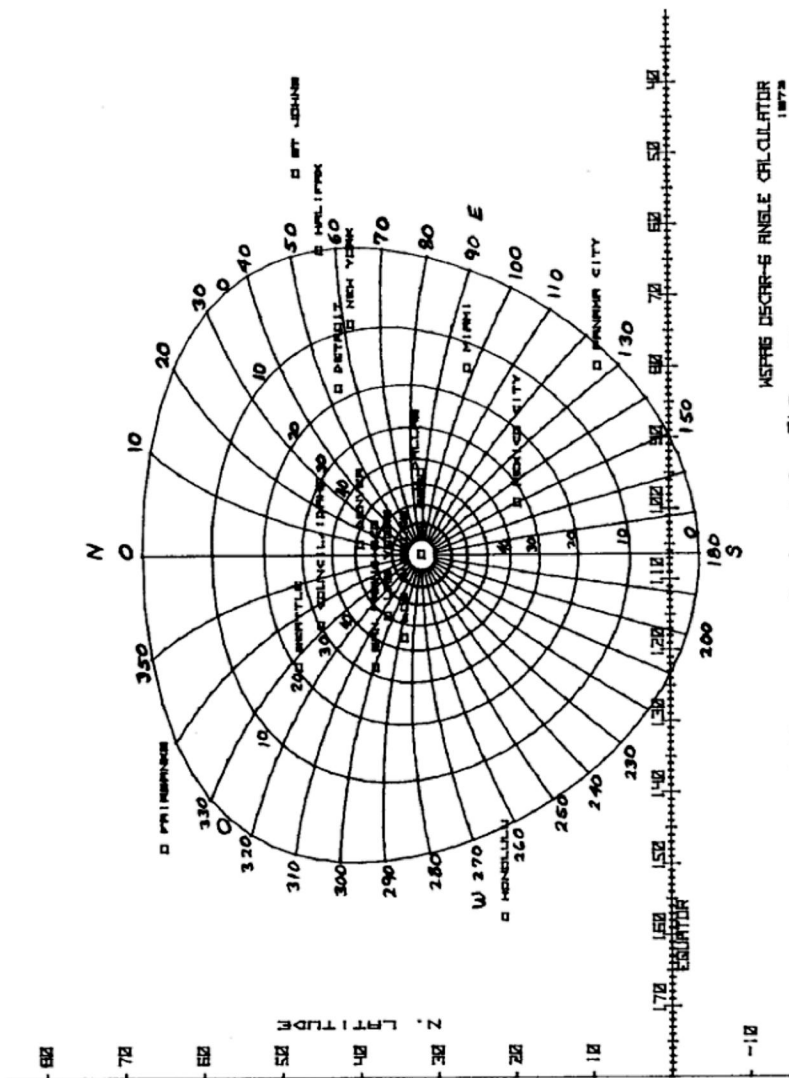


Figure 1. OSCAR-6 Nomogram Centered On El Paso, Texas

WSTF DESCR-6 ANGEL CIRCULATOR
1972

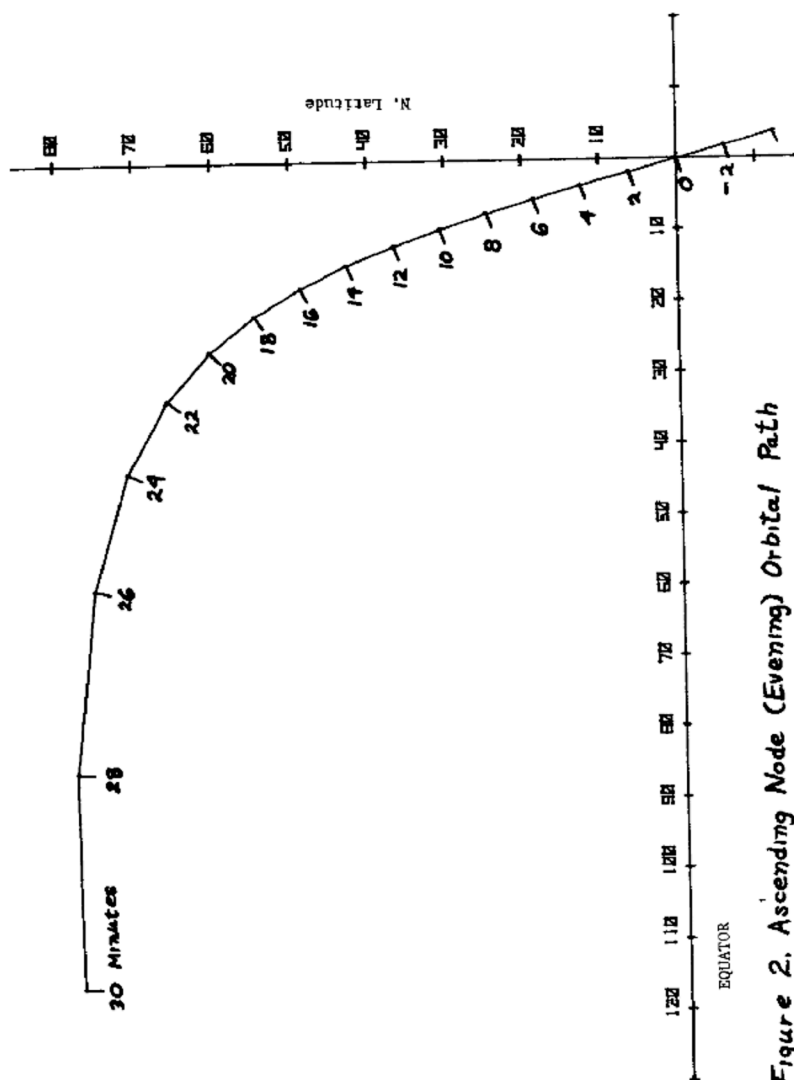


Figure 2. Ascending Node (Evening) Orbital Path

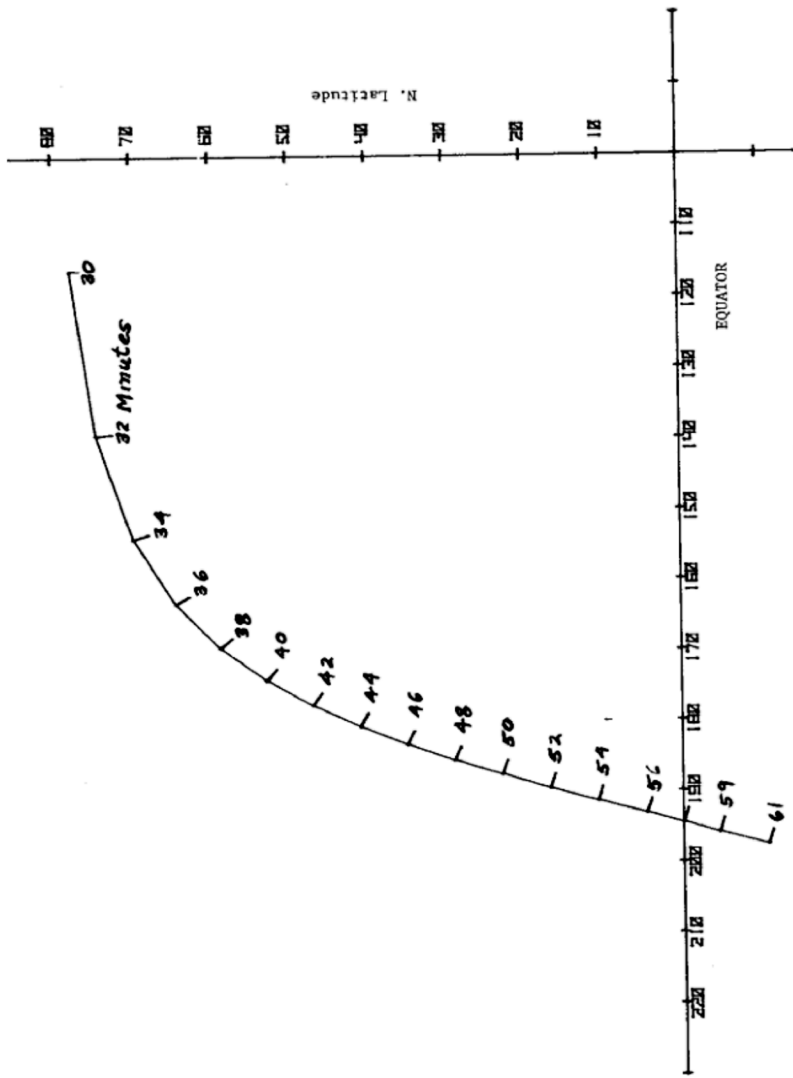


Figure 3. Descending Node (Morning) Orbital Path

nomogram. The equator crossing point on the overlay is positioned at the point on the equator line of the nomogram corresponding to the equator crossing point of the particular orbit being considered. The ascending node overlay is positioned at the equator crossing point given in the tables in the Newsletter or in the WIAW broadcasts. However, when the satellite is in the descending node, the north-to-south crossing point must be determined and the descending node overlay equator crossing point positioned at this point. For OSCAR 6 the descending node crossing point can be easily determined by subtracting 165.6 degrees from the ascending node crossing point.

Once the overlay is positioned, the antenna heading and elevation angles can be easily read as a function of time. The time read on the overlays is the time from equator crossing, and the actual time is found by adding the time read to the equator crossing time for the particular orbit in question.

This nomogram provides a fast and easy method for determining antenna angles during a pass. About five minutes preparation are normally required to prepare a table showing where to point the antennas during the pass. The information in the tables can then be used to position the antenna during the pass.



Perry Klein, K3JTE (holding trophy) awards the first AMSAT-OSCAR Worked All States trophy to Jack Colson, W3TMZ at the AMSAT Annual Meeting. Also in the picture is Bill Hunter, K4TI (seated at the right) who completed the second OSCAR WAS.

Standing at the right is Larry Kayser, VE3QB who gave an interesting presentation on his automated AMSAT-OSCAR 6 command station at the ARRL Technical Symposium.

AMSAT-OSCAR 6
VISUAL OBSERVATION REPORT
15 October 73

By Robert Crumrine, WB2DNN

To date, observations of AMSAT-OSCAR 6 have been made on two orbits. Its brightness variations are very large and it is probably spinning fairly fast.

The first optical sighting, to my knowledge, was made by Ray Newell, a member of the Rochester Moonwatch Team, on 26 September, orbit 4325 at about 0155Z. As OSCAR entered his field of view, it flashed to about 5th magnitude (just visible to the naked eye), then quickly faded to below his threshold (10th magnitude) when he lost it. He was using a 5 inch apogee refracting telescope with a 2 1/2 degree diameter field of view.

Both Ray and I saw it on orbit 4375, 30 Sept. at 0144Z, using larger telescopes this time. Again, it brightened rapidly, only to 8th magnitude though, then faded to below our threshold, 12th magnitude. It was visible for a total of about 5 seconds. Both instruments were homemade 8 inch reflecting telescopes with a one degree field of view.

AMSAT-OSCAR 6 was located using information from a detailed computer printout of circumstances for optical observations donated by ZIPSAT. Its position for a particular time was plotted on Webb's Atlas of the Stars. Then the position was located by noting the surrounding star patterns, and I just waited until it came into view.

During future observations, I would like to try to follow OSCAR from one peak to the next to see what kind of difference there is in peak brightness. This way I hope to determine spin rate and possibly the axis of rotation. To do this, I have converted a 6 inch telescope to a 3 degree field of view.

In conclusion, I would like to recognize the considerable computer work done by Ed Steeble, K3IXD, and Jim Welch, WB2DEI. They both have been working on programs to pinpoint OSCAR, and after a few more bugs are worked out, they will be off and running. I would also like to thank Mr. Norton Goodwin, Director, ZIPSAT Information Services, for donating some of his ZIPSAT orbital data in the meantime.*

*Further information on how to optically track OSCAR 6 and other satellites may be obtained by writing Mr. Norton Goodwin, Director, ZIPSAT Information Services, 824 Connecticut Avenue, N.W., Washington, D.C. 20006.

AMSAT-OSCAR 6 OPERATING SCHEDULE

The current operating schedule of the AMSAT-OSCAR 6 satellite is as follows:

Thursdays, Saturdays, Mondays (GMT days) --

Satellite repeater ON for communications during south-to-north passes only. These ascending node passes are within range of your location during the late afternoon and evenings.

Tuesdays, Fridays, Sundays (GMT days) -- Beginning on December 2, the repeater will be ON during north-to-south (local morning) passes, primarily for use in educational demonstrations. All users are urged to arrange demonstrations for your local schools and other community groups, and to let AMSAT and ARRL know about them.

Telemetry data is taken on the reference orbits., i.e., about 5-15 minutes after the first equatorial crossing of each Greenwich day. AMSAT is in need of more telemetry collection stations. Please help us by sending us any data received on the 29.450 MHz beacon (including any old data on past orbits that you may not have sent us). Data is constantly needed if we are to successfully achieve additional months of operation with OSCAR 6 beyond its first birthday.

AMSAT-OSCAR 6 COMMUNICATOR ENDORSEMENTS NOW AVAILABLE

Special AMSAT-OSCAR 6 endorsement stickers are now available for attachment at the bottom of your AMSAT membership certificate. These "AMSAT-OSCAR 6 COMMUNICATOR" endorsements are available to AMSAT members upon receipt of an up-to-date list (in call-letter order) of all the QSL cards you have received for two-way contacts through the satellite.

To receive your endorsement, send a completed "AMSAT/OSCAR CHECK-SHEET FOR CONFIRMED TWO-WAY CONTACTS" and a self-addressed envelope to:

AMSAT-OSCAR 6 Endorsement Dept.
P. O. Box 27
Washington, D.C. 20044

Please include your AMSAT membership number as it appears on your membership certificate.



RUBBER STAMP OF AMSAT-OSCAR 6 NOW AVAILABLE

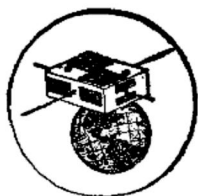
Rubber stamps similar to the one shown on this page are now available.

The stamps show AMSAT-OSCAR 6 and the Earth surrounded by a 1.75 inch diameter circular border.

These are available, post-paid within the U.S. and Canada, for \$3.50 from:

Al Simpson, WA5TJB
1005 East "I" Street
Russellville, Arkansas 72801

For shipment to other countries please include an additional 50¢ for air mail postage. A smaller version without the border is available for use in limited space. This would be ideal for the backs of QSL cards. The price is \$2.50 PPD, U.S. and Canada.



The following data for AMSAT-OSCAR 6 are supplied by AMSAT. The times are in GMT and the Longitudes are in degrees west of Greenwich.

Period = 114.99455 Minutes

Longitude Increment = 28.7487° per orbit.

Note that orbits repeat on a 263-orbit cycle every three weeks (i.e., every 21 days), but 3.6 minutes later and 0.9 degrees further west.

REV	DATE	TIME Z	LONG °
5151	DEC	1 0045.5	59.3
5164	DEC	2 0141.5	73.0
5176	DEC	3 0041.5	86.0
5189	DEC	4 0135.4	99.4
5201	DEC	5 0035.4	112.7
5214	DEC	6 0131.3	126.0
5226	DEC	7 0031.2	139.5
5239	DEC	8 0125.1	152.7
5251	DEC	9 0025.1	166.2
5264	DEC	10 0121.0	179.7
5276	DEC	11 0020.8	192.9
5289	DEC	12 0115.7	206.6
5301	DEC	13 0015.6	219.6
5314	DEC	14 0110.7	233.3
5326	DEC	15 0010.7	246.3
5339	DEC	16 0105.6	259.1
5351	DEC	17 0005.5	272.0
5364	DEC	18 0100.5	285.4
5376	DEC	19 0000.4	298.9
5389	DEC	20 0055.3	311.5
5402	DEC	21 0150.2	325.2
5414	DEC	22 0050.2	338.2
5427	DEC	23 0145.1	351.9
5439	DEC	24 0045.0	364.9
5452	DEC	25 0140.0	378.7
5464	DEC	26 0039.9	391.5
5477	DEC	27 0134.8	405.4
5489	DEC	28 0034.8	418.4
5502	DEC	29 0129.7	431.3
5514	DEC	30 0029.6	445.1
5527	DEC	31 0124.6	458.8
5539	JAN	1 0024.5	473.8
5552	JAN	2 0119.4	487.5
5564	JAN	3 0019.4	501.5
5577	JAN	4 0114.3	515.2
5589	JAN	5 0014.2	529.2
5602	JAN	6 0109.2	543.0
5614	JAN	7 0009.1	556.9
5627	JAN	8 0104.0	570.7
5639	JAN	9 0004.0	584.7
5652	JAN	10 0058.9	598.4
5665	JAN	11 0153.8	612.1
5677	JAN	12 0053.7	626.1
5690	JAN	13 0148.7	639.5
5702	JAN	14 0048.6	653.8
5715	JAN	15 0143.5	667.6
5727	JAN	16 0043.5	681.6
5740	JAN	17 0138.4	695.1
5752	JAN	18 0038.3	708.3
5765	JAN	19 0133.3	721.0
5777	JAN	20 0033.2	734.0
5790	JAN	21 0128.1	747.7
5802	JAN	22 0028.1	761.7
5815	JAN	23 0123.0	775.4
5827	JAN	24 0022.9	789.4
5840	JAN	25 0117.9	802.7
5852	JAN	26 0017.8	816.1
5865	JAN	27 0112.7	829.9
5877	JAN	28 0012.7	843.6
5890	JAN	29 0107.6	857.6
5902	JAN	30 0007.5	871.5
5915	JAN	31 0102.5	885.3
5927	FEB	1 0002.4	899.3
5940	FEB	2 0057.3	912.0
5952	FEB	3 0152.2	925.9
5965	FEB	4 0052.2	939.7
5977	FEB	5 0147.1	953.5
5990	FEB	6 0047.0	967.5
6003	FEB	7 0142.0	981.2
6015	FEB	8 0041.9	995.2
6028	FEB	9 0136.8	1009.0
6040	FEB	10 0036.8	1022.9
6053	FEB	11 0131.7	1036.6
6065	FEB	12 0031.6	1050.6
6078	FEB	13 0126.6	1064.3
6090	FEB	14 0026.5	1078.3
6103	FEB	15 0121.4	1091.1
6115	FEB	16 0021.4	1105.0
6128	FEB	17 0116.3	1118.8
6140	FEB	18 0016.2	1132.4
6153	FEB	19 0111.2	1146.5
6165	FEB	20 0011.1	1160.5
6178	FEB	21 0106.0	1174.2
6190	FEB	22 0006.0	1188.2
6203	FEB	23 0100.9	1201.9
6215	FEB	24 0000.8	1215.9
6228	FEB	25 0055.7	1229.6
6241	FEB	26 0150.7	1243.4
6253	FEB	27 0050.6	1257.4
6266	FEB	28 0145.5	1271.1

REV	DATE	TIME	Z	LONG	W	REV	DATE	TIME	Z	LONG	W
6278	MAR	1	0045.5	69.1		6466	MAR	16	0104.4	63.8	
6291	MAR	2	0140.4	72.8		6478	MAR	17	0004.4	68.8	
6303	MAR	3	0040.3	67.8		6491	MAR	18	0059.3	62.6	
6316	MAR	4	0135.3	71.6		6504	MAR	19	0154.2	76.3	
6328	MAR	5	0035.2	66.8		6516	MAR	20	0054.2	61.3	
6341	MAR	6	0130.1	70.3		6529	MAR	21	0149.1	75.0	
6353	MAR	7	0030.1	65.2		6541	MAR	22	0049.0	60.0	
6366	MAR	8	0125.0	69.0		6554	MAR	23	0144.0	73.7	
6378	MAR	9	0024.9	64.0		6566	MAR	24	0043.9	68.7	
6391	MAR	10	0119.9	67.7		6579	MAR	25	0138.8	72.4	
6403	MAR	11	0019.8	62.7		6591	MAR	26	0038.8	67.4	
6416	MAR	12	0114.7	66.4		6604	MAR	27	0133.7	71.2	
6428	MAR	13	0014.7	61.4		6616	MAR	28	0033.6	66.1	
6441	MAR	14	0109.6	65.1		6629	MAR	29	0128.6	69.9	
6453	MAR	15	0009.5	60.1		6641	MAR	30	0028.5	64.9	
						6654	MAR	31	0123.4	68.6	

"AMSAT-Deutschland e. V." founded

This summer a number of amateurs of the Federal Republic of Germany founded the association "AMSAT-Deutschland e. V.," abbreviated AMSAT-DL, with the address:

D - 3550 Marbach, Fuchsweg 10, W. Germany.

AMSAT-DL is a non-profit association working towards the construction and operation of radio amateur satellites as a public service.

As the name suggests, AMSAT-DL works closely together with AMSAT, Inc., Washington. OSCAR 7 will contain a number of subsystems built by AMSAT-DL, particularly the DJ4ZC 70 cm-to-2m linear repeater. Also AMSAT-DL is contributing the main power regulators, satellite structure and parts of the 70cm/2m antenna system.

The Board of Directors is composed of Karl Meinzer, DJ4ZC, Werner Haas, DJ5KQ, and Hans Koch, DK8FJ. The information service of AMSAT-DL is handled by Alexander Schoening, DC7AS, Maximiliankorse 52, 1 Berlin 28, W. Germany, who will be happy to supply all information regarding AMSAT-DL and their projects.

LETTERS

I believe that the unprecedented achievement by OSCAR 6 of a one-year active lifetime represents without a doubt the greatest single advance in the history of amateur radio since the discovery of the world below 200 meters. Everyone connected with OSCAR 6 should be congratulated in the strongest possible terms for your respective roles in making this first long-lived, easily-accessed amateur radio communications satellite a reality.

Raphael Soifer, K2QBW
Glen Rock, N.J.
October 15, 1973

HAPPY BIRTHDAY AMSAT-OSCAR 6

Congratulations to the Radio Amateur Satellite Corporation on the occasion of completing one year's operation in space with your AMSAT-OSCAR 6 communications satellite. Achievements by the radio amateur community with this satellite have been quite remarkable. NASA wishes you even greater success with OSCAR 7.

James C. Fletcher
Administrator
National Aeronautics and Space
Administration
October 19, 1973

Happy birthday to OSCAR. My congratulations to all who contributed for this tremendous achievement.

BFRA VHF Section
Sofia, Bulgaria
October 19, 1973

Cheers and 73 to one year old OSCAR.

OH2RK
Helsinki, Finland
October 15, 1973

The past year has been one of great achievement of which you can all be real proud. I am grateful for the privilege of taking part in it. Sincere thanks and good wishes to all -- and long live OSCAR 6!

Bruce Rowlings, ZL1WB
Whangarei, Northland, New Zealand
Oct. 19, 1973

Congratulations on first year OSCAR 6. Significant milestone for amateur radio.

WIA- Project Australis
Melbourne, Australia
October 16, 1973

Happy first birthday for OSCAR 6!

Eugenio C. Fontana, LU9MA
Mendoza, Argentina
Oct. 20, 1973